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APPLICANTS:		Hideo TODOKORO, et al.
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FOR	:	**SCANNING ELECTRON MICROSCOPE**
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EXAMINER	:	K. T. Nguyen (Anticipated)

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PRELIMINARY AMENDMENT

SIR:

Prior to examination of this continuation application, please enter the following amendments:

IN THE SPECIFICATION:

Page 1: After the title, insert –This is a continuation of application number 09/486,042 filed 17 February 2000, which is a 371 of PCT/JP99/00990 filed 1 March 1999, the contents of which are incorporated herein by reference.

Page 12, lines 18-27 through **Page 13**, lines 1-11:

Below will be explained the principle of detection of the secondary signal 23 in this embodiment. This example uses an electron gun acceleration voltage 6 of 2 kV, [an acceleration voltage 22 at the lower stage] a acceleration voltage 22 of 7 kV, and a retarding voltage 13 of 1 kV, however these values are intended to explain the invention and are not to be construed to limit the scope of the invention.

The secondary signal 23 generated on the specimen 12 (which consists of secondary electrons whose emission energy is in the range of 0 V to about 10 V and the [highest] peak

at about 2 V and reflected electrons whose emission energy is 1 kV) is accelerated by the retarding voltage 13 which is applied to the specimen 12 and by the [acceleration voltage 22 at the lower stage] <u>the post acceleration voltage 22</u>. With this, the secondary electrons having energy of 8 kV and the reflected electrons having energy of 9 kV pass through the object lens 17.

After passing by the [acceleration electrode 9 at the lower stage] <u>the post acceleration electrode 9</u>, the secondary signal 23 is decelerated by 7 kV. The secondary electrons are decelerated to have an energy of 1 kV and the reflected electrons are decelerated to have an energy of 2 kV.

<u>Page 21</u>, lines 9-13:

It is also possible to turn off the retarding voltage 13 which is added to the mid-point of the static deflectors 41a and 41b in Fig. 1 to drive up the secondary electrons and cause the second detector 35 <u>in Fig. 1</u> to detect both secondary and reflected electrons.

<u>Page 25</u>, lines 1-11:

Fig. 5 shows the configuration of a scanning electron microscope which is another embodiment of the present invention. In this embodiment, the magnetic path of the object lens 17 is divided into an upper magnetic [path] <u>yoke</u> 25 and a lower magnetic path 26. A lower acceleration voltage 22 is applied to the upper magnetic path and works as a lower acceleration electrode. This configuration reduces a possibility of misalignment of the lower acceleration electrode to the axis of the object lens in comparison to a [lower] <u>post</u> acceleration electrode which is provided separately.

<u>Page 26</u>, lines 14-28 through Page 27, lines 1-12:

Fig. 7 (A) shows the schematic block diagram of the electrostatic deflection electrodes 41a and 41b and their vicinity in Fig. 1. Fig. 7 (B) shows the distribution of potentials along the axis. The secondary electrons 102 which are accelerated by the retarding voltage (not visible in the drawing) applied to the specimen are decelerated in the secondary electron [detecting unit 103] <u>detector 34</u>. A voltage almost equivalent to that applied to the specimen is applied to this secondary electron detecting unit 103 and the secondary electrons 102 are decelerated down to energy of about 10 eV in the acceleration/deceleration area 104.

The decelerated secondary electrons 102 are deflected by the static deflection electrode 41a to which a negative voltage is applied (relative to the specimen voltage) and the

static deflection electrode 41b to which a positive voltage is applied. The static deflection electrode 41b is a wire grid through which the deflected secondary electrons [5] 102 can pass through. The magnetic deflection coil 40a produces a magnetic field which perpendicularly intersects an electric field that the static deflection electrodes 41a and 41b produce to cancel deflection of the primary electron beam by the static deflection electrodes.

The secondary electrons [5] 102 passing through the static deflection electrode 41b (wire grid) are attracted to the scintillator 43 to which a positive high voltage (10 kV) is applied and hit the scintillator 43 to illuminate it.

Page 27, lines 26-27, through **Page 28**, lines 1-9:

This phenomenon is more striking when the distance between the static deflection electrodes 41a and 41b is made wider (to have a larger diameter) to take in secondary electrons [5] 102 which are deflected much away from the axis of the electron beam by the scanning deflectors 15 and 16.

This kind of field penetration also occurs in the acceleration/deceleration area 105. In some cases, the secondary electrons 102 entering the space between the static deflection electrode 41a and 41b may pass through the deflection area and the acceleration/deceleration area [105] 105/104

Page 28, lines 18-27 through **Page 29**, lines 1-3:

The lower ends of the static deflection electrodes 101a and 101b which produce a traverse electric field are wide-spaced to catch secondary electrons [5] 102 which move further away from the axis of the electron beam. The [uppers part] upper parts of the static deflection electrodes 101a and 101b are made narrower and the resulting deflection field becomes stronger than that of the lower half of the static deflection electrodes 101a and 101b. The secondary electrons [5] 102 taken into the space of the static deflection electrodes 101a and 101b are efficiently deflected towards the static deflection electrode 101b by the comparatively strong deflection field produced by the upper half of the static deflection electrodes 101a and 101b.

Page 29, lines 8-23:

As already explained, the potential of the area which deflects secondary electrons is approximately equal to the potential of the specimen. This potential causes the acceleration/deceleration areas 107 (entrance) and 105 (exit) to produce a strong deceleration

field and a strong acceleration field respectively. If these strong electric fields invade the deflection space formed by the static deflection electrodes 101a and 101b, they may repulse the secondary electrons back to the specimen as already explained. To prevent this problem (or to reduce the influence of the electric field upon the space formed by the static deflection electrodes 101a and 101b), the embodiment of the present invention has [a deceleration] <u>an intermediate deceleration</u> electrode 108 whose voltage can be controlled independently of the retarding voltage and the boosting voltage in the acceleration/deceleration area 107.

<u>Page 30</u>, lines 4-8:

Further, a grid 109 on [the deceleration electrode 109] <u>an intermediate deceleration electrode 108</u> can control penetration of the deceleration field more effectively. The grid 109 has an aperture in the center (where the axis of the electron beam intersects) to allow the primary electron beam 110 to pass through.

and lines 23-25

[Fig. 9 shows the schematic block diagram of another example of means for forming an electric field to reduce secondary signals.]

<u>Page 31</u>, lines 26-27, through **<u>Page 32</u>**, lines 1-14:

The reflective wall electrode 112 and the static deflection electrode 101a can be built in a body as these electrodes can be in the same potential [level]. The secondary electrons 102 passing through the static deflection electrode 101b are attracted to the scintillator 43 to which 10 kV is applied, accelerated and finally hit the scintillator 43 to illuminate.

[In this embodiment, as a retarding voltage 13 is applied to the static deflection electrodes 101a and 101b, a potential difference generates between the electrodes 101a and 101b and the body tube (not visible in the drawing), and this potential has a possibility to scatter the secondary signal coming up from the specimen. This problem can be solved by surrounding the static deflection electrodes 101a and 101b by a reflective wall electrode 112.]

<u>Page 33</u>, lines 25-27, through **<u>Page 34</u>**, lines 1-27:

Fig. 12 shows an embodiment which applies a retarding voltage 13 to both a [unit 103] <u>detector 34</u> for detecting secondary electrons and a unit [118] <u>detector 35</u> for detecting reflected electrons. The primary electron beam [110] <u>7</u> undergoes deceleration on passing through the Butler type deceleration lens 119, goes through the reflected electron detector

[118] 35 and the secondary electron detector [103] 34, and undergoes acceleration in the space of the deceleration electrode 108.

As the retarding voltage 13 (1 kV) is comparatively great relative to the acceleration voltage of the [electro] electron gun (2 kV) and the reflecting plate 29 has a very small opening (about 1 mm in diameter) to let the primary electron beam [110] 7 pass through, an aberration is apt to generate and consequently the diameter of the primary electron beam may increase. However the Butler type deceleration lens, when installed, can decelerate the primary electron beam while suppressing the generation of an aberration. The reflected electron detector [118] 35 and the secondary electron detector [103] 34 are isolated from each other by a wire grid electrode 120. A negative voltage 122 which is higher by a few ten [voltages] volts than the deflection electrode voltage 121 is applied to the wire grid electrode 120, which prevents the secondary electrons 102 from going into the reflected electron detector [118] 35. This also prevents the secondary electrons [123] 30 reflected by the reflecting plate 29 from going into the secondary electron detector [103] 34.

Page 35, lines 9-20:

Meanwhile, the reflected electron detector 118 causes the reflected electrons [124] 51 passing through the secondary electron detector [103] 34 to be reflected by the reflecting plate 29 and guides to the scintillator 32. In other words, when the reflected electrons [124] 51 hit the reflecting plate 29, new secondary electrons [123] 30 come out from the reflecting plate, undergo deflection by the deflection field produced by the static deflection electrodes 31a and 31b, and pass through the wire grid of the static deflection electrode 31b. The succeeding operation of the reflected electron detector [118] 35 is the same as that of the secondary electron detector [103] 34.

Page 37, lines 18-27 through **Page 38**, lines 1-3:

The first detector 34 has a wire grid 55 to which a retarding voltage 13 is applied at its entrance. The secondary electrons 50 emitted from the specimen 12 at the same potential as the retarding voltage 53 can go into the first detector 34 but the positively-charged secondary electrons 50 [(in Fig. 13)] are repulsed by the wire grid 55 and cannot get to the first detector 34.

Fig. 14 shows the configuration of an embodiment of the present invention to solve such a problem. Fig. 1 and Fig. 14 are the same except that [Fig. 1] Fig. 14 has a surface voltage correcting voltage source 124 (means for applying a variable voltage) between the specimen and the retarding voltage 53.

Page 42, lines 2-8:

The example shown in Fig. 5 performs retarding by applying a retarding voltage to the specimen holder 100 and to the control electrode 27. This configuration forms a potential area having the same voltage as the retarding voltage between the specimen holder 100 and the control electrode 27. This seems that the retarding voltage is applied to the specimen 12 in the [potential] equipotential area.